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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,784	03/26/2001	Kazuhiro Hattori	010328	5542

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WASHINGTON, DC 20006

EXAMINER

VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/816,784

Applicant(s)

HATTORI, KAZUHIRO

Examiner

Lan Vinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/816,784.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbons et al (US 6,421,212) in view of DeOrnellas et al (6,287,975) and further in view of Nakatani (US 6,391,216)

Gibbons discloses a method for forming a magnetoresistive element by etching.

This method comprises the steps of :

forming a layer 150 of magnetic material such as CoPt/Cobalt platinum alloy, the layer 150 is etched (col 6, lines 44-46)

forming a protective layer of Ta/Tantalum over/on the layer 150 is usually desirable (col 6, lines 48-49)

etching the CoPt layer 150 using directional etching/anisotropic etching (col 6, lines 50-52), which reads on dry etching the CoPt layer

Unlike the instant claimed inventions as per claims 1, 2, 4, Gibbons does not specifically disclose using the tantalum/tantalum nitride layer as a mask layer on the CoPt alloy layer

However, DeOrnellas discloses a method for using an hardmask/mask of Ta/TaN (tantalum nitride) in a plasma etching step comprises the step of forming a resist pattern

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on the metal layer to be etched and sputtering the Ta/TaN mask layer on the metal layer(col 4, lines 3-6, col 5, lines 13-17)

Since Gibbons discloses that it is desirable to form a layer of Ta/Tantalum over/on the CoPt layer 150, one skilled in the art would have found it obvious to employ Gibbons's Ta layer as a mask layer in view of DeOrnellas teaching because DeOrnellas states that an hard mask layer of a reactive metal such as Ta protects at least a part of the layer to be etched in order to define the feature (col 6, lines 50-54)

Gibbons and DeOrnellas fail to disclose the step of dry etching the CoPt alloy layer/magnetic material layer under a reaction gas of a carbon monoxide/Co with an additive of a nitrogen compound gas.

Nakatani discloses a method of RIE etching/dry etching comprises the step of etching a magnetic material layer such as Co alloy using a mixture of CO and nitrogen compound gas such as  $\text{NH}_3$  (col 6, lines 21-30)

Hence, one skilled in the art would have found it obvious to modify Gibbons and DeOrnellas by etching the CoPt layer using a mixture of CO and nitrogen compound gas such as  $\text{NH}_3$  as per Nakatani because Nakatani states that a mixture of CO and nitrogen compound gas such as  $\text{NH}_3$  is preferably used for etching a magnetic material (col 6, lines 29-31)

The limitation of forming a resist pattern on the layer to be etched and sputtering a mask layer using Ta, as recited in claims 3, 7, has been discussed above.

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3. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbons et al (US 6,421,212) in view of DeOrnellas et al (6,287,975) and Nakatani (US 6,391,216) and further in view of Tao et al (US 5,874,010)

Gibbons as modified by DeOrnellas and Nakatani has been discussed above in paragraph 2. Unlike the instant claimed inventions as per claims 5, 6, Gibbons, DeOrnellas and Nakatani do not disclose reactive-sputtering a mask layer (TaN) using a mixture gas of Ar and nitrogen.

However, Tao, in a method of etching the pole material using ion beam etching/dry etching, discloses forming a TaN mask by reactive sputtering using Ar and nitrogen (col 4, lines 4-7)

Since Gibbons and DeOrnellas are directed to an etching method using a TaN mask layer, one skilled in the art would have found it obvious to modify Gibbons, DeOrnellas and Nakatani by forming a TaN mask using reactive sputtering in the presence of Ar and nitrogen as per Tao because Tao teaches that in the case where mask layer is a nitride, it can be formed by reactive sputtering in the presence of Ar and Nitrogen (col 4, lines 1-7)

#### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

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5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.

NADINE G. NORTON  
PRIMARY EXAMINER



LV  
October 3, 2003